

IN THE CLAIMS:

This listing of the claim will replace all prior versions and listings of claim in the present application.

Listing of Claims

1. (currently amended) A disk array comprising:

a plurality of disk units;

at least one spare disk unit serving as a spare for said disk units;

a first control unit, to be connected to a host unit, for controlling input and output between said host unit and said disk array;

a second control unit, connected ~~to~~ to said spare disk and said disk units, for controlling input and output between said first control unit and said disk units and controlling transfers between said disk units;

a common memory which stores disk management data indicating a status of each of said disk units; and

a plurality of multiplex communication channels each connecting some of said disk units, said spare disk and said second control unit,

wherein data transfer in each of said multiplex communication channels is controlled by said second control unit, and data transfer speed of said multiplex communication channel is higher than that of each of said disk units,

wherein said disk units form a plurality of groups each including at least one disk unit from each communication channel, and

wherein data of a disk unit connected to one communication channel of a group can be recovered using data of another disk unit connected to another communication channel of said group.

2. (original) A disk array according to claim 1, wherein said second control unit transmits or receives a command to or from a certain one of said disk units and said spare disk and writes data of said certain disk unit into said spare disk.

3. (previously presented) A disk array according to claim 1, wherein said disk array is provided with the plurality of communication channels, and a switch is provided to interconnect said communication channels so that communication can be made between said disk units connected to said respective communication channels, and a processing is made through said switch between said disk units and said spare disk connected to another communication channel.

4. (original) A disk array according to claim 3, wherein when a first control portion of a first one of said communication channels cannot operate, a first disk unit of said disk units is accessed from a second control portion through said switch.

5. (previously presented) A disk array according to claim 1, wherein said disk array is provided with the plurality of communication channels, and a parity group is constructed by said disk units connected to other communication channels.

6. (previously presented) A disk array according to claim 1, wherein said communication channel is a loop made of a fiber channel capable of time

division multiplex communication.

7. (previously presented) A disk array comprising:

a plurality of disk units;

a first control unit, to be connected to a host unit, for controlling input and output between said host unit and said disk;

a second control unit, connected to said disk units, for controlling input and output between said first control unit and said disk units and controlling transfers between said disk units;

a common memory which stores disk management data indicating a status of each of said disk units; and

a plurality of multiplex communication channels connecting some of said disk units and said second control unit,

wherein data transfer in said multiplex communication channel is controlled by said second control unit, and data transfer speed of said multiplex communication channel is higher than that of each of said disk units,

wherein said disk units form a plurality of groups each including at least one disk unit from each communication channel, and

wherein data of a disk unit connected to one communication channel of a group can be recovered using data of another disk unit connected to another communication channel of said group.

8. (original) A disk array according to claim 7, wherein said second control unit transmits or receives a command to or from a certain one of said disk

units and writes data of said certain disk unit into another one of said disk units.

9. (previously presented) A disk array according to claim 7, wherein said disk array is provided with the plurality of communication channels, and a switch is provided to interconnect said communication channels so that communication can be made between said disk units connected to said respective communication channels, and a processing is made through said switch between said disk units connected to another communication channel.

10. (original) A disk array according to claim 9, wherein when a first control portion of a first one of said communication channels cannot operate, a first disk unit of said disk units is accessed from a second control portion through said switch.

11. (previously presented) A disk array according to claim 7, wherein said disk array is provided with the plurality of communication channels, and a parity group is constructed by said disk units connected to other communication channels.

12. (original) A disk array according to claim 7, wherein said communication channel is a loop made of a fiber channel capable of time division multiplex communication.

13. (previously presented) A disk array comprising:
a plurality of disk units;

at least one spare disk unit serving as a spare for said disk units;

a first control unit, to be connected to a host unit, for controlling input and output between said host unit and said disk array;

a second control unit, connected to said spare disk and said disk units, for controlling input and output between said first control unit and said disk units and controlling transfers between said disk units;

a common memory which stores disk management data indicating a status of each of said disk units, said common memory being accessible by each control unit; and

a plurality of multiplex communication channels each connecting some of said disk units, said spare disk and said second control unit,

wherein data transfer in said multiplex communication channel is controlled by said second control unit, and data transfer speed of said multiplex communication channel is higher than that of each of said disk units,

wherein said disk units form a plurality of groups each including at least one disk unit from each communication channel, and

wherein data of a disk unit connected to one communication channel of a group can be recovered using data of another disk unit connected to another communication channel of said group.

14. (original) A disk array according to claim 13, wherein said second control unit transmits or receives a command to or from a certain one of said disk units and said spare disk and writes data of said certain disk unit into said spare disk.

15. (original) A disk array according to claim 13, wherein said disk array is provided with the plurality of communication channels, and a switch is provided to interconnect said communication channels so that communication can be made between said disk units connected to said respective communication channels, and a processing is made through said switch between said disk units and said spare disk connected to another communication channel.

16. (original) A disk array according to claim 15, wherein when a first control portion of a first one of said communication channels cannot operate, a first disk unit of said disk units is accessed from a second control portion through said switch.

17. (previously presented) A disk array according to claim 13, wherein said disk array is provided with the plurality of communication channels, and a parity group is constructed by said disk units connected to other communication channels.

18. (original) A disk array according to claim 13, wherein said communication channel is a loop made of a fiber channel capable of time division multiplex communication.

19. (previously presented) A disk array comprising:
a plurality of disk units;
a first control unit, to be connected to a host unit, for controlling input and

output between said host unit and said disk array;

a second control unit, connected to said disk units, for controlling input and output between said first control unit and said disk units and controlling transfers between said disk units;

a common memory which stores disk management data indicating a status of each of said disk units, said common memory being accessible by each control unit; and

a plurality of multiplex communication channels each connecting some of said disk units and said second control unit,

wherein data transfer in said multiplex communication channel is controlled by said second control unit, and data transfer speed of said multiplex communication channel is higher than that of each of said disk units,

wherein said disk units form a plurality of groups each including at least one disk unit from each communication channel, and

wherein data of a disk unit connected to one communication channel of a group can be recovered using data of another disk unit connected to another communication channel of said group.

20. (original) A disk array according to claim 19, wherein said second control unit transmits or receives a command to or from a certain one of said disk units and writes data of said certain disk unit into another one of said disk units.

21. (previously presented) A disk array according to claim 19, wherein said disk array is provided with the plurality of communication channels, and a switch

is provided to interconnect said communication channels so that communication can be made between said disk units connected to said respective communication channels, and a processing is made through said switch between said disk units connected to another communication channel.

22. (original) A disk array according to claim 21, wherein when a first control portion of a first one of said communication channels cannot operate, a first disk unit of said disk units is accessed from a second control portion through said switch.

23. (original) A disk array according to claim 19, wherein said disk array is provided with the plurality of communication channels, and a parity group is constructed by said disk units connected to other communication channels.

24. (original) A disk array according to claim 19, wherein said communication channel is a loop made of a fiber channel capable of time division multiplex communication.